



# **Update from NASA Astrobiology Program**

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## Exobiology – ROSES 2021

ROSES-20 full proposals were due 5/22/20

156 Proposals submitted

- 23 proposals were selected for funding

Final Selection rate is **14.7%**

Exobiology in ROSES-21 will be a No Due Dates program

- Using past submission #s
- Expect review panels every 2-3 months
- Will likely split Rolling Evaluation Panels into 4-5 topics
- If you won't be submitting, please volunteer to serve!!



## Habitable Worlds – ROSES 20

### ROSES-20

Step 1 was due 11/17/20 (received 147); Step 2 was due 1/15/21 (received 71)

Will be reviewed DAPR.

### ROSES-19

65 Proposals submitted

- 7 proposals were selected for funding

Selection rate is **10.7%**

Currently: 3 active FINESST



# Planetary Science and Technology through Analog Research (PSTAR)

## ROSES-20

PSTAR will not be solicited, moving to a biennial solicitation cadence

Currently: 7 active grants, 1 active NESSF award.



# Interdisciplinary Consortia for Astrobiology Research (ICAR)



First ICAR Selected 8 teams (6- 15% Re,d 2- Descoped)

Awards will be made in Feb 2021

5 year awards

Avg award size \$5M

Cadence will be every 3 years.

Next subset of topics TBD

## PROGRAM NEWS

ROSES-19 Amendment 8:  
Interdisciplinary Consortia for  
Astrobiology Research (ICAR)



# Measures of Success of RCN

- ❖ **Investigators carry out and propose interdisciplinary research through new collaborations stimulated by RCN interactions**
- ❖ Demonstration of technology transfer between research areas and disciplines
- ❖ Produces a plan for utilization of current mission data and spawns ideas for new and exciting missions (if applicable)
- ❖ Influences Decadal Surveys for all SMD Divisions
- ❖ Enhances international engagement
- ❖ Supports development of early AB community



# Research Coordination Networks Update

## **NExSS**

investigate the diversity of exoplanets and to learn how their history, geology, and climate interact to create the conditions for life

## **NfoLD**

investigate life detection research, including biosignature creation and preservation, as well as related technology development

## **From Early Cells to Multicellularity**

investigate the earliest biological processes and the evolution of life on Earth into more complex organisms up to the advent of multicellularity

## **Prebiotic Chemistry and Early Earth Environments**

Investigate chemical processes under the conditions on the Early Earth and the formation of basic proto/biological molecules and pathways, leading to the emergence of systems harboring the potential for life

## **Ocean Worlds (Habitable Worlds)**

investigate the diversity of other worlds in the solar system and to learn how their history, geology, and climate interact to create the conditions for life





# Research Coordination Networks Update

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Follow up meeting to Habitable Worlds 2017  
Co-Hosted NExSS, AAS and NExSci  
Abstracts-207  
Paid Registrants-411  
Strong Early Career Presence



# Research Coordination Networks Update

## Ocean Sciences Across the Solar System A PSD/ESD initiative

**Goal:** Develop synergistic research questions and collaborations between Earth and Planetary ocean sciences to move forward research related to ocean worlds. By creating a coordinated joint community of scientists from both divisions, identify knowledge gaps, identify opportunities for testable ideas based on the Earth System, and develop a strategy to advance our knowledge of Ocean Worlds in our solar system. **These communities began as one and this initiative will bring the two communities back together.**

**Ocean Worlds  
(Habitable Worlds)**  
investigate the diversity of other worlds in the solar system and to learn how their history, geology, and climate interact to create the conditions for life





## **Overarching topics and questions identified by consensus of researchers from both ESD and PSD:**

- **Leveraging comparative oceanography between Earth and other Ocean Worlds**
- **Ocean Worlds as integrated systems**
- **Understanding the properties of environmental change in Ocean Worlds**
- **Methods to look for past and extant life on Ocean Worlds**
- **Defining and characterizing habitable environments in Ocean World systems**
- **Research in analog environments to enable studies of Ocean Worlds**
- **Necessary broad reaching technology requirements for in-situ and remote sensing exploration of Ocean Worlds.**

**White papers for each topic forth coming**



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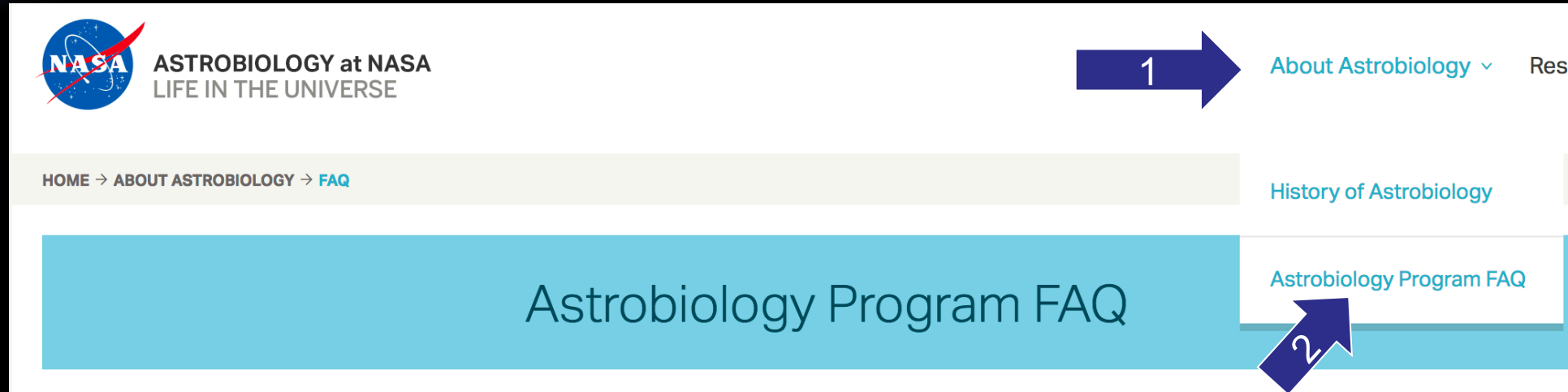
# Earliest Cells to Multicellularity



COMING SOON

Request for Information on themes, structure, and operation March 2020  
Received 9 responses  
Contributors spanned the notional scope

# NASA Astrobiology Program – FAQs Updated



This document contains answers to Frequently Asked Questions about the Astrobiology Program organized by topical areas:

- NASA Astrobiology Program (goals, 2015 Strategy, history, contact)
- Funding Astrobiology Research (ICAR, Workshops, Early Career, topic-specific programs)
- Coordinating Astrobiology Research (RCNs: what, who, how)



# Astrobiology Program NPP Fellows

Currently 14 active NPP Fellows and one NPMP Fellow

- Fellows are distributed across RCN teams, Exo and PSTAR awards and former NAI teams

5 new Fellows pending start dates

- Four awaiting visas
- One expected to accept by 2/26

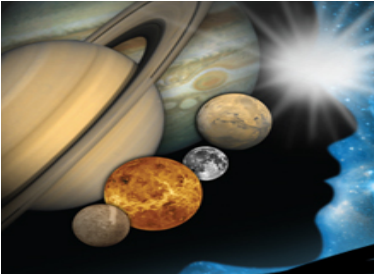
Remaining productive during the pandemic

- Many are back in the lab, others working effectively remotely
- Publishing
- Presenting and organizing sessions at conferences/workshops

Provided presentations on their research in July 2020

We are not accepting applications for the March 1 deadline.





# International Summer School in Astrobiology

<https://astrobiology.nasa.gov/career-funding/astrobiology-summer-school/>

The week long Josep Comas i Solà International Astrobiology Summer School is co-sponsored by the NASA Astrobiology Program and the Centro de Astrobiologia since 2002

2020 Summer School was canceled

2021 Summer School is scheduled for September 5 – 10, contingent on travel approval, includes lectures a group project and a visit to a location of astrobiological interest

**Topic: Searching for Life on Mars:** Techniques and Challenges

Includes 15 – 20 participants (grad students/postdocs) and two lecturers from the US and an equal number from ESA member states

U.S. Director is Rosaly Lopes, JPL

# Astrobiology Graduate Conference (AbGradCon)

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Student organized/led annual conference, held annually, both in the U.S. and internationally  
Applications and size has grown tremendously since 2004 and now includes roughly 100 graduate students and postdoctoral fellows, who provide oral or poster presentations

Well balanced for gender, geographical distribution and disciplines represented

2020 conference canceled

2021 conference scheduled for **September 14 – 17**, 2021, contingent on travel approval, at the Earth Life Science Institute, Tokyo, Japan

Applications are currently open



14-18 September  
ELSI, Tokyo

[www.abgradcon.org](http://www.abgradcon.org)  
[@abgradcon](https://twitter.com/abgradcon)  
[#AbGradCon2020](https://twitter.com/abgradcon)

## AbGradCon 2020





# Astrobiology Learning Progressions

The Astrobiology Learning Progressions provides direct connections between

- **discipline-based, fundamental concepts in science** that guide what teachers must teach and benchmark what students learn in which grades and
- the **interdisciplinary core concepts** of astrobiology.

The AB LP's are a collection of interdisciplinary narratives—one for each of 23 different astrobiology concepts—each of which is presented four times, progressed in depth and sophistication through the grade bands (**K-2, 3-5, 6-8, 9-12**).

The AB LP's are meant to serve two primary audiences:

- Educators: supporting them to use astrobiology content to teach the discipline-based topics required by the standards.
- Astrobiologists: supporting them to communicate with learners across the grade bands/spectrum.



<https://astrobiology.nasa.gov/education/alp/>

# Organization and Structure

## List of Core Learning Questions and Sub-Questions

### 1. How did matter come together to make planets and life in the first place?

- 1.1: Are we really made of star stuff?
- 1.2: How did our Solar System form?

### 2. How did Earth become a planet on which life could develop?

- 2.1: What was the Earth like right after it formed?
- 2.2: How was the Sun different when it formed compared to now?
- 2.3: Where could life have gotten started on Earth?

### 3. What is life?

- 3.1: What are the characteristics of life?
- 3.2: What does life need for survival?
- 3.3: What determines if a planet can have life?
- 3.4: Why is water so important for life as we know it?
- 3.5: How can we tell if something is alive or not?

### 4. How did life on Earth originate?

- 4.1: Where do life's building blocks come from?
- 4.2: What are the sources of life's building blocks within the Earth?
- 4.3: What are the sources of life's building blocks outside the Earth?

### 5. How have life and Earth co-evolved?

- 5.1: How did life first emerge on Earth?
- 5.2: How did the first cells arise?
- 5.3: How did life become something that competes for resources and evolves?

### 6. How has life evolved to survive in diverse environments on Earth?

- 6.1: How did life on Earth come to occupy so many different environments?
- 6.2: What types of conditions can life survive in?
- 6.3: Are there environments beyond Earth that could be habitable?

### 7. How do we explore beyond Earth for signs of life?

- 7.1: What is a biosignature?
- 7.2: How do we explore within our own Solar System for signs of life?
- 7.3: How do we discover worlds around other stars?
- 7.4: How can we identify worlds around other stars that could have life?



6. How has life evolved to survive in diverse environments on Earth?

### 6.3. Are there environments beyond Earth that could be habitable?



Grades 3-5 or Adult Emerging Learner

Storyline

NGSS Connections for Teachers

Concept Boundaries for Scientists

Resources

When people go on vacation or go camping they think about where they're going and make sure they pack all the kinds of things that they'll need. Maybe they'll take along enough clothes or food for their trip or maybe a tent or things for cooking. For people to live in the wild it can be pretty difficult, especially compared to how we usually live in our homes. However, there are many living things everywhere in this world and most of them don't need to pack a suitcase or take anything extra with them to live in the wild. That's because they're suited to the places in which they live. But what about beyond Earth? Do you think there are things that are suited to living on worlds like Mars or Venus or in other places in our solar system? One of the goals of astrobiology is to figure this out!





# Astrobiology for the Incarcerated

National Aeronautics and  
Space Administration



Initiative to bring Science Programs to the Incarcerated  
(INSPIRE)

Programs piloted 2017-2019 with funding from  
NASA Astrobiology Program

Nalini



Joslyn



Kelli



- Astrobiology lecture given to **~1400 adults**
- Astrobiology hands-on program given to **~300 youth**
- 26 facilities in four states (UT, WA, OH, FL)
- December, 2017 – March, 2019
- IRB-approved surveys administered; data collected from **~1000 matched-pairs (adults only)**
  - Significant gains in content knowledge, value of science, science identity, and future actions
  - Manuscript in press now





# Astrobiology Graphic Histories

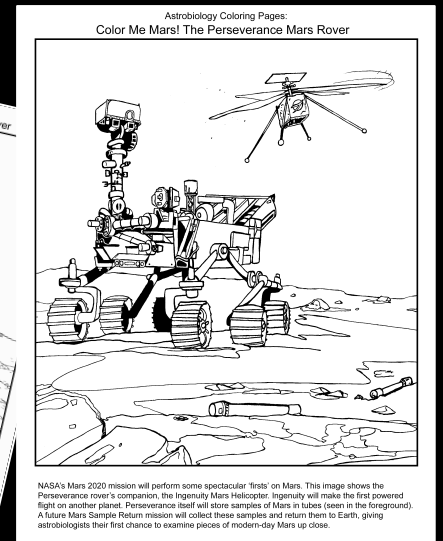
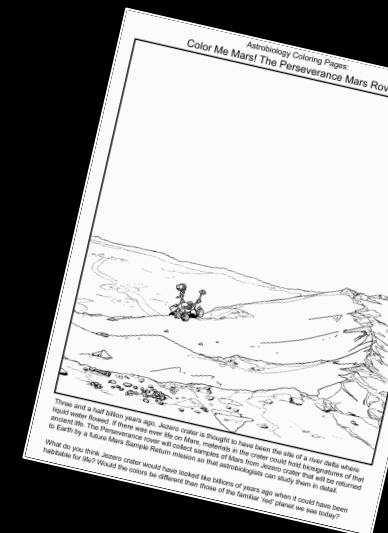
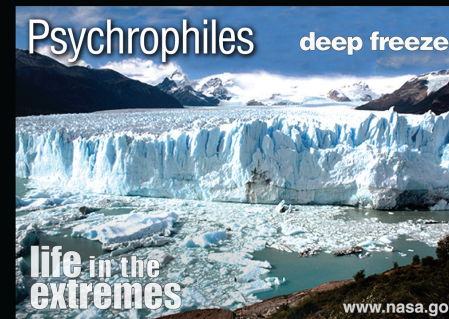


## Astrobiology Hero Posters



## Astrobiology Coloring Pages

## Extremophile Trading Cards







**Questions?**